

Pt. 430, Subpt. B, App. J

10 CFR Ch. II (1–12 Edition)

4.2.2.2.1 *Annual cooking energy consumption.* Calculate the annual energy consumption for cooking, E_{CC} , in Btu's (kJ) per year for a gas cooking top, defined as:

$$E_{CC} = \frac{O_{CT}}{\text{Eff}_{CT}},$$

Where:

O_{CT} =527.6 kBtu (556,618 kJ) per year, annual useful cooking energy output.

Eff_{CT} =the gas cooking top efficiency as defined in Section 4.2.1.3.

4.2.2.2.2 *Annual energy consumption of any continuously burning gas pilots.* Calculate the annual energy consumption of any continuously burning gas pilot lights of the cooking top, E_{PC} , in Btu's (kJ) per year, defined as:

$$E_{PC} = Q_{CP} \times A \times H,$$

Where:

Q_{CP} =pilot light gas flow rate as measured in Section 3.2.2.1.

A =8,760 hours, the total number of hours in a year.

H =either H_n or H_p , the heating value of the gas used in the test as specified in Section 2.2.2.2. and Section 2.2.2.3, expressed in Btu's per standard cubic foot (kJ/L) of gas.

4.2.2.2.3 *Total annual energy consumption of a conventional gas cooking top.* Calculate the total annual energy consumption of a conventional gas cooking top, E_{CA} , in Btu's (kJ) per year, defined as:

$$E_{CA} = E_{CC} + E_{PC},$$

Where:

E_{CC} =energy consumption for cooking as determined in Section 4.2.2.2.1.

E_{PC} =annual energy consumption of the pilot lights as determined in Section 4.2.2.2.2.

4.2.3 *Conventional cooking top energy factor.* Calculate the energy factor or ratio of useful cooking energy output for cooking to the total energy input, R_{CT} , as follows:

For an electric cooking top, the energy factor is the same as the cooking efficiency as determined according to Section 4.2.1.3.

For gas cooking tops,

$$R_{CT} = \frac{O_{CT}}{E_{CA}},$$

Where:

O_{CT} =527.6 kBtu (556,618 kJ) per year, annual useful cooking energy output of cooking top.

E_{CA} =total annual energy consumption of cooking top determined according to Section 4.2.2.2.3.

4.3 *Combined components.* The annual energy consumption of a kitchen range, *e.g.* a

cooktop and oven combined, shall be the sum of the annual energy consumption of each of its components. The annual energy consumption for other combinations of ovens and cooktops will also be treated as the sum of the annual energy consumption of each of its components. The energy factor of a combined component is the sum of the annual useful cooking energy output of each component divided by the sum of the total annual energy consumption of each component.

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APPENDIX J TO SUBPART B OF PART 430—UNIFORM TEST METHOD FOR MEASURING THE ENERGY CONSUMPTION OF AUTOMATIC AND SEMI-AUTOMATIC CLOTHES WASHERS

The provisions of this appendix J shall apply to products manufactured after April 13, 2001. The procedures and calculations in sections 3.3, 4.3, and 4.4 of this appendix need not be performed to determine compliance with the energy conservation standards for clothes washers.

1. Definitions

1.1 *Adaptive control system* means a clothes washer control system, other than an adaptive water fill control system, which is capable of automatically adjusting washer operation or washing conditions based on characteristics of the clothes load placed in the clothes container, without allowing or requiring consumer intervention or actions. The automatic adjustments may, for example, include automatic selection, modification, or control of any of the following: wash water temperature, agitation or tumble cycle time, number of rinse cycles, and spin speed. The characteristics of the clothes load, which could trigger such adjustments, could, for example, consist of or be indicated by the presence of either soil, soap, suds, or any other additive laundering substitute or complementary product.

NOTE: Appendix J does not provide a means for determining the energy consumption of a clothes washer with an adaptive control system. Therefore, pursuant to 10 CFR 430.27, a waiver must be obtained to establish an acceptable test procedure for each such clothes washer.

1.2 *Adaptive water fill control system* means a clothes washer water fill control system which is capable of automatically adjusting the water fill level based on the size or weight of the clothes load placed in the clothes container, without allowing or requiring consumer intervention and/or actions.

1.3 *Bone-dry* means a condition of a load of test cloth which has been dried in a dryer

at maximum temperature for a minimum of 10 minutes, removed and weighed before cool down, and then dried again for 10-minute periods until the final weight change of the load is 1 percent or less.

1.4 *Clothes container* means the compartment within the clothes washer that holds the clothes during operation of the machine.

1.5 *Compact* means a clothes washer which has a clothes container capacity of less than 1.6 ft³ (45 L).

1.6 *Deep rinse cycle* means a rinse cycle in which the clothes container is filled with water to a selected level and the clothes load is rinsed by agitating it or tumbling it through the water.

1.7 *Front-loader clothes washer* means a clothes washer which sequentially rotates or tumbles portions of the clothes load above the water level allowing the clothes load to fall freely back into the water. The principal axis of the clothes container is in a horizontal plane and the access to the clothes container is through the front of the machine.

1.8 *Lockout* means that at least one wash/rinse water temperature combination is not available in the normal cycle that is available in another cycle on the machine.

1.9 *Make-up water* means the amount of fresh water needed to supplement the amount of stored water pumped from the external laundry tub back into the clothes washer when the suds-return feature is activated in order to achieve the required water fill level in the clothes washer.

1.10 *Modified energy factor* means the quotient of the cubic foot (or liter) capacity of the clothes container divided by the total clothes washer energy consumption per cycle, with such energy consumption expressed as the sum of the machine electrical energy consumption, the hot water energy consumption, and the energy required for removal of the remaining moisture in the wash load.

1.11 *Most energy intensive cycle* means the non-normal cycle that uses the most energy for a given wash/rinse temperature combination.

1.12 *Non-normal cycle* means a cycle other than the normal cycle, but does not include any manually selected pre-wash, pre-soak, and extra-rinse option.

1.13 *Nonwater-heating clothes washer* means a clothes washer which does not have an internal water heating device to generate hot water.

1.14 *Normal cycle* means the cycle recommended by the manufacturer for washing cotton and/or linen clothes.

1.15 *Sensor filled* means a water fill control which automatically terminates the fill when the water reaches an appropriate level in the tub.

1.16 *Spray rinse cycle* means a rinse cycle in which water is sprayed onto the clothes

load for a definite period of time without maintaining any specific water level in the clothes container.

1.17 *Standard* means a clothes washer which has a clothes container capacity of 1.6 ft³ (45 L) or greater.

1.18 *Suds-return* means a feature or option on a clothes washer which causes the stored wash water obtained by utilizing the suds-saver feature to be pumped from the external laundry tub back into the clothes washer.

1.19 *Suds-saver* means a feature or option on a clothes washer which allows the user to store used wash water in an external laundry tub for use with subsequent wash loads.

1.20 *Temperature use factor* means the percentage of the total number of washes a user would wash with a particular wash/rinse temperature setting.

1.21 *Thermostatically controlled water valves* means clothes washer controls that have the ability to sense and adjust the hot and cold supply water.

1.22 *Time filled* means a water fill control which uses a combination of water flow controls in conjunction with time to terminate the water fill cycle.

1.23 *Top-loader-horizontal-axis clothes washer* means a clothes washer which: rotates or tumbles portions of the clothes load above the water level allowing the clothes load to fall freely back into the water with the principal axis in a horizontal plane and has access to the clothes container through the top of the clothes washer.

1.24 *Top-loader-vertical-axis clothes washer* means a clothes washer that: flexes and oscillates the submerged clothes load through the water by means of mechanical agitation or other movement; has a clothes container with the principal axis in a vertical plane; and has access to the clothes container through the top of the clothes washer.

1.25 *Water consumption factor* means the quotient of the total weighted per-cycle water consumption divided by the capacity of the clothes washer.

1.26 *Water-heating clothes washer* means a clothes washer where some or all of the hot water for clothes washing is generated by a water heating device internal to the clothes washer.

2. Testing Conditions

2.1 *Installation.* Install the clothes washer in accordance with manufacturer's instructions.

2.2 *Electrical energy supply.* Maintain the electrical supply at the clothes washer terminal block within 2 percent of 120, 120/240 or 120/208Y volts as applicable to the particular terminal block wiring system as specified by the manufacturer. If the clothes washer has a dual voltage conversion capability, conduct the test at the highest voltage specified by the manufacturer.

2.3 *Supply water.* For nonwater-heating clothes washers not equipped with thermostatically controlled water valves, the temperature of the hot and cold water supply shall be maintained at $100^{\circ}\text{F} \pm 10^{\circ}\text{F}$ ($37.8^{\circ}\text{C} \pm 5.5^{\circ}\text{C}$). For nonwater-heating clothes washers equipped with thermostatically controlled water valves, the temperature of the hot water supply shall be maintained at $140^{\circ}\text{F} \pm 5^{\circ}\text{F}$ ($60.0^{\circ}\text{C} \pm 2.8^{\circ}\text{C}$) and the cold water supply shall be maintained at $60^{\circ}\text{F} \pm 5^{\circ}\text{F}$ ($15.6^{\circ}\text{C} \pm 2.8^{\circ}\text{C}$). For water-heating clothes washers, the temperature of the hot water supply shall be maintained at $140^{\circ}\text{F} \pm 5^{\circ}\text{F}$ ($60.0^{\circ}\text{C} \pm 2.8^{\circ}\text{C}$) and the cold water supply shall not exceed 60°F (15.6°C). Water meters shall be installed in both the hot and cold water lines to measure water consumption.

2.3.1 *Supply water requirements for water and energy consumption testing.* For nonwater-heating clothes washers not equipped with thermostatically controlled water valves, the temperature of the hot and cold water supply shall be maintained at $100^{\circ} \pm 10^{\circ}\text{F}$ ($37.8^{\circ}\text{C} \pm 5.5^{\circ}\text{C}$). For nonwater-heating clothes washers equipped with thermostatically controlled water valves, the temperature of the hot water supply shall be maintained at $140^{\circ}\text{F} \pm 5^{\circ}\text{F}$ ($60.0^{\circ}\text{C} \pm 2.8^{\circ}\text{C}$) and the cold water supply shall be maintained at $60^{\circ}\text{F} \pm 5^{\circ}\text{F}$ ($15.6^{\circ}\text{C} \pm 2.8^{\circ}\text{C}$). For water-heating clothes washers, the temperature of the hot water supply shall be maintained at $140^{\circ}\text{F} \pm 5^{\circ}\text{F}$ ($60.0^{\circ}\text{C} \pm 2.8^{\circ}\text{C}$) and the cold water supply shall not exceed 60°F (15.6°C). Water meters shall be installed in both the hot and cold water lines to measure water consumption.

2.3.2 *Supply water requirements for remaining moisture content testing.* For nonwater-heating clothes washers not equipped with thermostatically controlled water valves, the temperature of the hot water supply shall be maintained at $140^{\circ}\text{F} \pm 5^{\circ}\text{F}$ and the cold water supply shall be maintained at $60^{\circ}\text{F} \pm 5^{\circ}\text{F}$. All other clothes washers shall be connected to water supply temperatures as stated in 2.3.1 of this appendix.

2.4 *Water pressure.* The static water pressure at the hot and cold water inlet connections of the machine shall be maintained during the test at 35 pounds per square inch gauge (psig) ± 2.5 psig ($241.3 \text{ kPa} \pm 17.2 \text{ kPa}$). The static water pressure for a single water inlet connection shall be maintained during the test at 35 psig ± 2.5 psig ($241.3 \text{ kPa} \pm 17.2 \text{ kPa}$). Water pressure gauges shall be installed in both the hot and cold water lines to measure water pressure.

2.5 *Instrumentation.* Perform all test measurements using the following instruments, as appropriate:

2.5.1 *Weighing scales.*

2.5.1.1 *Weighing scale for test cloth.* The scale shall have a resolution no larger than 0.2 oz (5.7 g) and a maximum error no greater than 0.3 percent of the measured value.

2.5.1.2 *Weighing scale for clothes container capacity measurements.* The scale should have a resolution no larger than 0.50 lbs (0.23 kg) and a maximum error no greater than 0.5 percent of the measured value.

2.5.2 *Watt-hour meter.* The watt-hour meter shall have a resolution no larger than 1 Wh (3.6 kJ) and a maximum error no greater than 2 percent of the measured value for any demand greater than 50 Wh (180.0 kJ).

2.5.3 *Temperature measuring device.* The device shall have an error no greater than $\pm 1^{\circ}\text{F}$ ($\pm 0.6^{\circ}\text{C}$) over the range being measured.

2.5.4 *Water meter.* The water meter shall have a resolution no larger than 0.1 gallons (0.4 liters) and a maximum error no greater than 2 percent for all water flow rates from 1 gal/min (3.8 L/min) to 5 gal/min (18.9 L/min).

2.5.5 *Water pressure gauge.* The water pressure gauge shall have a resolution no larger than 1 psig (6.9 kPa) and shall have an error no greater than 5 percent of any measured value over the range of 32.5 psig (224.1 kPa) to 37.5 psig (258.6 kPa).

2.6 *Test cloths.*

2.6.1 *Energy test cloth.* The energy test cloth shall be clean and consist of the following:

2.6.1.1 Pure finished bleached cloth, made with a momie or granite weave, which is 50 percent cotton and 50 percent polyester and weighs 5.75 oz/yd² (195.0 g/m²) and has 65 ends on the warp and 57 picks on the fill.

2.6.1.2 Cloth material that is 24 in by 36 in (61.0 cm by 91.4 cm) and has been hemmed to 22 in by 34 in (55.9 cm by 86.4 cm) before washing. The maximum shrinkage after five washes shall not be more than four percent on the length and width.

2.6.1.3 The number of test runs on the same energy test cloth shall not exceed 60 test runs. All energy test cloth must be permanently marked identifying the lot number of the material. Mixed lots of material shall not be used for testing the clothes washers.

2.6.2 *Energy Stuffer Cloth.* The energy stuffer cloths shall be made from energy test cloth material and shall consist of pieces of material that are 12 inches by 12 inches (30.5 cm by 30.5 cm) and have been hemmed to 10 inches by 10 inches (25.4 cm by 25.4 cm) before washing. The maximum shrinkage after five washes shall not be more than four percent on the length and width. The number of test runs on the same energy stuffer cloth shall not exceed 60 test runs. All energy stuffer cloth must be permanently marked identifying the lot number of the material. Mixed lots of material shall not be used for testing the clothes washers.

2.7 *Composition of test loads.*

2.7.1 *Seven pound test load.* The seven pound test load shall consist of bone-dry energy test cloths which weigh 7 lbs ± 0.07 lbs (3.18 kg ± 0.03 kg). Adjustments to the test

Department of Energy

Pt. 430, Subpt. B, App. J

load to achieve the proper weight can be made by the use of energy stuffer cloths.

2.7.2 *Three pound test load.* The three pound test load shall consist of bone-dry energy test cloths which weigh 3 lbs \pm 0.03 lbs (1.36 kg \pm 0.014 kg). Adjustments to the test load to achieve the proper weight can be made by the use of energy stuffer cloths.

2.8 *Use of test loads.*

2.8.1 For a standard size clothes washer, a seven pound load, as described in section 2.7.1, shall be used to test the maximum water fill and a three pound test load, as described in section 2.7.2, shall be used to test the minimum water fill.

2.8.2 For a compact size clothes washer, a three pound test load as described in section 2.7.2 shall be used to test the maximum and minimum water fill levels.

2.8.3 A vertical-axis clothes washer without adaptive water fill control system also shall be tested without a test load for purposes of calculating the energy factor.

2.8.4 The test load sizes to be used to measure remaining moisture content (RMC) are specified in section 3.3.2.

2.8.5 Load the energy test cloths by grasping them in the center, shaking them to hang loosely and then dropping them into the clothes container prior to activating the clothes washer.

2.9 *Preconditioning.* If the clothes washer has not been filled with water in the preceding 96 hours, pre-condition it by running it through a cold rinse cycle and then draining it to ensure that the hose, pump, and sump are filled with water.

2.10 *Wash time (period of agitation or tumble) setting.* If the maximum available wash time in the normal cycle is greater than 9.75 minutes, the wash time shall be not less than 9.75 minutes. If the maximum available wash time in the normal cycle is less than 9.75 minutes, the wash time shall be the maximum available wash time.

2.11 *Agitation speed and spin speed settings.* Where controls are provided for agitation speed and spin speed selections, set them as follows:

2.11.1 For energy and water consumption tests, set at the normal cycle settings. If settings at the normal cycle are not offered, set the control settings to the maximum speed permitted on the clothes washer.

2.11.2 For remaining moisture content tests, see section 3.3.

3. Test Measurements

3.1 *Clothes container capacity.* Measure the entire volume which a dry clothes load could occupy within the clothes container during washer operation according to sections 3.1.1 through 3.1.5.

3.1.1 Place the clothes washer in such a position that the uppermost edge of the clothes container opening is leveled hori-

zontally, so that the container will hold the maximum amount of water.

3.1.2 Line the inside of the clothes container with 2 mil (0.051 mm) plastic sheet. All clothes washer components which occupy space within the clothes container and which are recommended for use with the energy test cycle shall be in place and shall be lined with 2 mil (0.051 mm) plastic sheet to prevent water from entering any void space.

3.1.3 Record the total weight of the machine before adding water.

3.1.4 Fill the clothes container manually with either 60 °F \pm 5 °F (15.6 °C \pm 2.8 °C) or 100 °F \pm 10 °F (37.8 °C \pm 5.5 °C) water to its uppermost edge. Measure and record the weight of water, W, in pounds.

3.1.5 The clothes container capacity is calculated as follows:

$C=W/d$.

where:

C=Capacity in cubic feet (or liters).

W=Mass of water in pounds (or kilograms).

d=Density of water (62.0 lbs/ft³ for 100 °F (993 kg/m³ for 37.8 °C) or 62.3 lbs/ft³ for 60 °F (998 kg/m³ for 15.6 °C)).

3.2 *Test cycle.* Establish the test conditions set forth in section 2 of this appendix.

3.2.1 A clothes washer that has infinite temperature selections shall be tested at the following temperature settings: hottest setting available on the machine, hot (a minimum of 140 °F (60.0 °C) and a maximum of 145 °F (62.8 °C)), warm (a minimum of 100 °F (37.8 °C) and a maximum of 105 °F (40.6 °C)), and coldest setting available on the machine. These temperatures must be confirmed by measurement using a temperature measuring device. If the measured final water temperature is not within the specified range, stop testing, adjust the temperature selector accordingly, and repeat the procedure.

3.2.2 *Clothes washers with adaptive water fill control system and/or unique temperature selections.*

3.2.2.1 *Clothes washers with adaptive water fill control system.* When testing a clothes washer that has adaptive water fill control, the maximum and the minimum test loads as specified in 2.8.1 and 2.8.2 shall be used. The amount of water fill shall be determined by the control system. If the clothes washer provides consumer selection of variable water fill amounts for the adaptive water fill control system, two complete sets of tests shall be conducted. The first set of tests shall be conducted with the adaptive water fill control system set in the setting that will use the greatest amount of energy. The second set of tests shall be conducted with the adaptive water fill control system set in the setting that will use the smallest amount of energy. Then, the results from

these two tests shall be averaged to determine the adaptive water fill energy consumption value. If a clothes washer with an adaptive water fill control system allows consumer selection of manual controls as an alternative, both the manual and adaptive modes shall be tested and the energy consumption values, E_T , M_E , and D_E (if desired), calculated in section 4 for each mode, shall be averaged between the manual and adaptive modes.

3.2.2.2 Clothes washers with multiple warm wash temperature combination selections.

3.2.2.2.1 If a clothes washer's temperature combination selections are such that the temperature of each warm wash setting that is above the mean warm wash temperature (the mean temperature of the coldest and warmest warm settings) is matched by a warm wash setting that is an equal distance below the mean, then the energy test shall be conducted at the mean warm wash temperature if such a selection is provided, or if there is no position on the control that permits selection of the mean temperature, the energy test shall be conducted with the temperature selection set at the next hotter temperature setting that is available above the mean.

3.2.2.2.2 If the multiple warm wash temperature combination selections do not meet criteria in section 3.2.2.2.1, the energy test shall be conducted with the temperature selection set at the warm wash temperature setting that gives the next higher water temperature than the mean temperature of the coldest and warmest warm settings.

3.2.2.3 *Clothes washers with multiple temperature settings within a temperature combination selection.* When a clothes washer is provided with a secondary control that can modify the wash or rinse temperature within a temperature combination selection, the secondary control shall be set to provide the hottest wash temperature available and the hottest rinse temperature available. For instance, when the temperature combination selection is set for the middle warm wash temperature and a secondary control exists which allows this temperature to be increased or decreased, the secondary control shall be set to provide the hottest warm wash temperature available for the middle warm wash setting.

3.2.3 *Clothes washers that do not lockout any wash/rinse temperature combinations in the normal cycle.* Test in the normal cycle all temperature combination selections that are required to be tested.

3.2.3.1 *Hot water consumption, cold water consumption, and electrical energy consumption at maximum fill.* Set the water level selector at maximum fill available on the clothes washer, if manually controlled, and insert the appropriate test load, if applicable. Activate the normal cycle of the clothes washer and also any suds-saver switch.

3.2.3.1.1 For automatic clothes washers, set the wash/rinse temperature selector to the hottest temperature combination setting. For semi-automatic clothes washers, open the hot water faucet valve completely and close the cold water faucet valve completely to achieve the hottest temperature combination setting.

3.2.3.1.2 Measure the electrical energy consumption of the clothes washer for the complete cycle.

3.2.3.1.3 Measure the respective number of gallons (or liters) of hot and cold water used to fill the tub for the wash cycle.

3.2.3.1.4 Measure the respective number of gallons (or liters) of hot and cold water used for all deep rinse cycles.

3.2.3.1.5 Measure the respective gallons (or liters) of hot and cold water used for all spray rinse cycles.

3.2.3.1.6 For non-water-heating automatic clothes washers repeat sections 3.2.3.1.3 through 3.2.3.1.5 for each of the other wash/rinse temperature selections available that uses heated water and is required to be tested. For water-heating clothes washers, repeat sections 3.2.3.1.2 through 3.2.3.1.5 for each of the other wash/rinse temperature selections available that uses heated water and is required to be tested. (When calculating water consumption under section 4.3 for any machine covered by the previous two sentences, also test the cold wash/cold rinse selection.) For semi-automatic clothes washers, repeat sections 3.2.3.1.3 through 3.2.3.1.5 for the other wash/rinse temperature settings in section 6 with the following water faucet valve adjustments:

	Faucet position	
	Hot valve	Cold valve
Hot	Completely open	Closed.
Warm	Completely open	Completely open.
Cold	Closed	Completely open.

3.2.3.1.7 If the clothes washer is equipped with a suds-saver cycle, repeat sections 3.2.3.1.2 to 3.2.3.1.5 with suds-saver switch set to suds return for the Warm/Cold temperature setting.

3.2.3.2 *Hot water consumption, cold water consumption, and electrical energy consumption with the water level selector at minimum fill.* Set the water level selector at minimum fill, if manually controlled, and insert the appropriate test load, if applicable. Activate the normal cycle of the clothes washer and also any suds-saver switch. Repeat sections 3.2.3.1.1 through 3.2.3.1.7.

3.2.3.3 *Hot and cold water consumption for clothes washers that incorporate a partial fill during the rinse cycle.* For clothes washers that incorporate a partial fill during the rinse cycle, activate any suds-saver switch and operate the clothes washer for the complete normal cycle at both the maximum

Department of Energy

Pt. 430, Subpt. B, App. J

water fill level and the minimum water fill level for each of the wash/rinse temperature selections available. Measure the respective hot and cold water consumed during the complete normal cycle.

3.2.4 *Clothes washers that lockout any wash/rinse temperature combinations in the normal cycle.* In addition to the normal cycle tests in section 3.2.3, perform the following tests on non-normal cycles for each wash/rinse temperature combination selection that is locked out in the normal cycle.

3.2.4.1 Set the cycle selector to a non-normal cycle which has the wash/rinse temperature combination selection that is locked out. Set the water level selector at maximum fill and insert the appropriate test load, if applicable. Activate the cycle of the clothes washer and also any suds-saver switch. Set the wash/rinse temperature selector to the temperature combination setting that is locked out in the normal cycle and repeat sections 3.2.3.1.2 through 3.2.3.1.5.

3.2.4.2 Repeat section 3.2.4.1 under the same temperature combination setting for all other untested non-normal cycles on the machine that have the wash/rinse temperature combination selection that is locked out.

3.2.4.3 Total the measured hot water consumption of the wash, deep rinse, and spray rinse of each non-normal cycle tested in sections 3.2.4.1 through 3.2.4.2 and compare the total for each cycle. The cycle that has the highest hot water consumption shall be the most energy intensive cycle for that particular wash/rinse temperature combination setting.

3.2.4.4 Set the water level selector at minimum fill and insert the appropriate test load, if applicable. Activate the most energy intensive cycle, as determined in section 3.2.4.3, of the clothes washer and also any suds-saver switch. Repeat tests as described in section 3.2.4.1.

3.3 *Remaining Moisture Content (RMC).*

3.3.1 The wash temperature shall be the same as the rinse temperature for all testing. Cold rinse is the coldest rinse temperature available on the machine. Warm rinse is the hottest rinse temperature available on the machine.

3.3.2 Determine the test load as shown in the following table:

Container volume		Test load	
cu. ft. ≥ <	liter ≥ <	lb	kg
0-0.80	0-22.7	3.00	1.36
0.80-0.90	22.7-25.5	3.50	1.59
0.90-1.00	25.5-28.3	3.90	1.77
1.00-1.10	28.3-31.1	4.30	1.95
1.10-1.20	31.1-34.0	4.70	2.13
1.20-1.30	34.0-36.8	5.10	2.31
1.30-1.40	36.8-39.6	5.50	2.49
1.40-1.50	39.6-42.5	5.90	2.68
1.50-1.60	42.5-45.3	6.40	2.90

Container volume		Test load	
cu. ft. ≥ <	liter ≥ <	lb	kg
1.60-1.70	45.3-48.1	6.80	3.08
1.70-1.80	48.1-51.0	7.20	3.27
1.80-1.90	51.0-53.8	7.60	3.45
1.90-2.00	53.8-56.6	8.00	3.63
2.00-2.10	56.6-59.5	8.40	3.81
2.10-2.20	59.5-62.3	8.80	3.99
2.20-2.30	62.3-65.1	9.20	4.17
2.30-2.40	65.1-68.0	9.60	4.35
2.40-2.50	68.0-70.8	10.00	4.54
2.50-2.60	70.8-73.6	10.50	4.76
2.60-2.70	73.6-76.5	10.90	4.94
2.70-2.80	76.5-79.3	11.30	5.13
2.80-2.90	79.3-82.1	11.70	5.31
2.90-3.00	82.1-85.0	12.10	5.49
3.00-3.10	85.0-87.8	12.50	5.67
3.10-3.20	87.8-90.6	12.90	5.85
3.20-3.30	90.6-93.4	13.30	6.03
3.30-3.40	93.4-96.3	13.70	6.21
3.40-3.50	96.3-99.1	14.10	6.40
3.50-3.60	99.1-101.9	14.60	6.62
3.60-3.70	101.9-104.8	15.00	6.80
3.70-3.80	104.8-107.6	15.40	6.99

NOTES: (1) All test load weights are bone dry weights.
(2) Allowable tolerance on the test load weights are ±0.10 lbs (0.05 kg).

3.3.3 For clothes washers with cold rinse only.

3.3.3.1 Record the actual bone dry weight of the test load (WI), then place the test load in the clothes washer.

3.3.3.2 Set water level selector to maximum fill.

3.3.3.3 Run the normal cycle.

3.3.3.4 Record the weight of the test load immediately after completion of the normal cycle (WC).

3.3.3.5 Calculate the remaining moisture content of the test load, RMC, expressed as a percentage and defined as:

$$RMC = [(WC - WI) / WI] \times 100\%$$

3.3.4 For clothes washers with cold and warm rinse options.

3.3.4.1 Complete steps 3.3.3.1 through 3.3.3.4 for the cold rinse. Calculate the remaining moisture content of the test load for cold rinse, RMC_{COLD} , expressed as a percentage and defined as:

$$RMC_{COLD} = [(WC - WI) / WI] \times 100\%$$

3.3.4.2 Complete steps 3.3.3.1 through 3.3.3.4 for the warm rinse. Calculate the remaining moisture content of the test load for warm rinse, RMC_{WARM} , expressed as a percentage and defined as:

$$RMC_{WARM} = [(WC - WI) / WI] \times 100\%$$

3.3.4.3 Calculate the remaining moisture content of the test load, RMC, expressed as a percentage and defined as:

$$RMC = 0.73 \times RMC_{COLD} + 0.27 \times RMC_{WARM}$$

3.3.5 Clothes washers which have options that result in different RMC values, such as multiple selection of spin speeds or spin times that are available in the normal cycle,

shall be tested at the maximum and minimum settings of the available options, excluding any “no spin” (zero spin speed) settings, in accordance with requirements in 3.3.3 or 3.3.4. The calculated RMC_{\max} extraction and RMC_{\min} extraction at the maximum and minimum settings, respectively, shall be combined as follows and the final RMC to be used in section 4.2 shall be:

$$RMC = 0.75 \times RMC_{\max \text{ extraction}} + 0.25 \times RMC_{\min \text{ extraction}}$$

3.4 *Data recording.* Record for each test cycle in sections 3.2.1 through 3.3.5.

3.4.1 For non-water-heating clothes washers, record the kilowatt-hours of electrical energy, M_E , consumed during the test to operate the clothes washer in section 3.2.3.1.2. For water-heating clothes washers record the kilowatt-hours of electrical energy, E_h , consumed at maximum fill in sections 3.2.3.1.2 and 3.2.3.1.6, and E_h consumed at minimum fill in section 3.2.3.2.

3.4.2 Record the individual gallons (or liters) of hot and cold water consumption, V_h and V_c , measured at maximum fill level for each wash/rinse temperature combination setting tested in section 3.2.3, or in both 3.2.3 and 3.2.4, excluding any fresh make-up water required to complete the fill during a suds-return cycle.

3.4.3 Record the individual gallons (or liters) of hot and cold water consumption, V_h

and V_c , measured at minimum fill level for each wash/rinse temperature combination setting tested in section 3.2.3, or in both 3.2.3 and 3.2.4, excluding any fresh make-up water required to complete the fill during a suds-return cycle.

3.4.4 Record the individual gallons (or liters) of hot and cold water, Sh_H and Sc_H , measured at maximum fill for the suds-return cycle.

3.4.5 Record the individual gallons (or liters) of hot and cold water, Sh_L and Sc_L , measured at minimum fill for the suds-return cycle.

3.4.6 Data recording requirements for RMC tests are listed in sections 3.3.3 through 3.3.5.

4. Calculation of Derived Results From Test Measurements

4.1 Energy consumption.

4.1.1 *Per-cycle temperature-weighted hot water consumption for maximum and minimum water fill levels.* Calculate for the cycle under test the per-cycle temperature weighted hot water consumption for the maximum water fill level, $V_{h_{\max}}$, and for the minimum water fill level, $V_{h_{\min}}$, expressed in gallons per cycle (or liters per cycle) and defined as:

$$V_{h_{\max}} = X_1 \sum_{i=1}^n [(V_{h_i} \times L) \times TUF_i] + X_2 [TUF_W \times Sh_H]$$

$$V_{h_{\min}} = X_1 \sum_{j=1}^n [(V_{h_j} \times L) \times TUF_j] + X_2 [TUF_W \times Sh_L]$$

where:

V_{h_i} =reported hot water consumption in gallons per cycle (or liters per cycle) at maximum fill for each wash/rinse temperature combination setting, as provided in section 3.4.2. If a clothes washer is equipped with two or more different wash/rinse temperature selections that have the same basic temperature combination selection label (for example, one of them has its water temperature controlled by thermostatically controlled valves and the other one does not), then the largest V_{h_i} shall be used for this calculation. If a clothes washer has lockout(s), there will be “ V_{h_i} ’s” for wash/rinse temperature combination settings available in the normal cycle and “ V_{h_i} ’s” for wash/rinse temperature combination settings in the most energy intensive cycle.

V_{h_j} =reported hot water consumption in gallons per cycle (or liters per cycle) at min-

imum fill for each wash/rinse temperature combination setting, as provided in section 3.4.3. If a clothes washer is equipped with two or more different wash/rinse temperature selections that have the same basic temperature combination selection label (for example, one of them has its water temperature controlled by thermostatically controlled valves and the other one does not), then the largest V_{h_j} shall be used for the calculation. If a clothes washer has lockouts, there will be “ V_{h_j} ’s” for wash/rinse temperature combination settings available in the normal cycle and “ V_{h_j} ’s” for wash/rinse temperature combination settings in the most energy intensive cycle.

L =lockout factor to be applied to the reported hot water consumption. For wash/rinse temperature combination settings that are not locked out in the normal

Department of Energy

Pt. 430, Subpt. B, App. J

cycle, $L=1$. For each wash/rinse temperature combination setting that is locked out in the normal cycle, $L=0.32$ in the normal cycle and $L=0.68$, in the most energy intensive cycle.

TUF_i =applicable temperature use factor in section 5 or 6.

TUF_j =applicable temperature use factor in section 5 or 6.

n =number of wash/rinse temperature combination settings available to the user for the clothes washer under test. For clothes washers that lockout temperature selections in the normal cycle, n =the number of wash/rinse temperature combination settings on the washers plus the number of wash/rinse temperature combination settings that lockout the temperature selections in the normal cycle.

TUF_w =temperature use factor for warm wash setting.

For clothes washers equipped with the suds-saver feature:

X_1 =frequency of use without the suds-saver feature=0.86.

X_2 =frequency of use with the suds-saver feature=0.14.

Sh_H =fresh make-up water measured during suds-return cycle at maximum water fill level.

Sh_L =fresh hot make-up water measured during suds-return cycle at minimum water fill level.

For clothes washers not equipped with the suds-saver feature:

$X_1=1.0$

$X_2=0.0$

$$E_{TG} = E_T \times \frac{1}{e} \times \left[\frac{3412 \text{ Btu}}{\text{kWh}} \right] \text{ or } E_{TG} = E_T \times \frac{1}{e} \times \left[\frac{3.6 \text{ MJ}}{\text{kWh}} \right]$$

where:

e =nominal gas or oil water heater efficiency=0.75.

E_T =as defined in section 4.1.3.

4.1.5 *Per-cycle machine electrical energy consumption.*

4.1.5.1 *Non-water-heating clothes washers.* The electrical energy value recorded for the maximum fill in section 3.4.1 is the per-cycle machine electrical energy consumption, M_E , expressed in kilowatt-hours per cycle.

4.1.5.2 *Water-heating clothes washers.*

4.1.5.2.1 Calculate for the cycle under test the per-cycle temperature weighted electrical energy consumption for the maximum water fill level, $E_{h_{max}}$, and for the minimum

4.1.2 *Total per-cycle hot water energy consumption for maximum and minimum water fill levels.* Calculate the total per-cycle hot water energy consumption for the maximum water fill level, E_{max} and for the minimum water fill level, E_{min} , expressed in kilowatt-hours per cycle and defined as:

$$E_{max} = [Vh_{max} \times T \times K \times MF]$$

$$E_{min} = [Vh_{min} \times T \times K \times MF]$$

where:

T =temperature rise=90 °F (50 °C).

K =water specific heat=0.00240 kWh/(gal- °F) [0.00114kWh/(L- °C)].

Vh_{max} =as defined in section 4.1.1.

Vh_{min} =as defined in section 4.1.1.

MF =multiplying factor to account for absence of test load=0.94 for top-loader vertical axis clothes washers that are sensor filled, 1.0 for all other clothes washers.

4.1.3 *Total weighted per-cycle hot water energy consumption expressed in kilowatt-hours.* Calculate the total weighted per cycle hot water energy consumption, E_T , expressed in kilowatt-hours per cycle and defined as:

$$E_T = [E_{max} \times F_{max}] + [E_{min} \times F_{min}]$$

where:

F_{max} =usage fill factor=0.72.

F_{min} =usage fill factor=0.28.

E_{max} =as defined in section 4.1.2.

E_{min} =as defined in section 4.1.2.

4.1.4 *Per-cycle water energy consumption using gas-heated or oil-heated water.* Calculate for the normal cycle the per-cycle energy consumption, E_{TG} , using gas-heated or oil-heated water, expressed in Btu per cycle (or megajoules per cycle) and defined as:

water fill level, $E_{h_{min}}$, expressed in kilowatt-hours per cycle and defined as:

$$E_{h_{max}} = \sum_{i=1}^n [E_{h_i} \times TUF_i]$$

where:

E_{h_i} =reported electrical energy consumption in kilowatt-hours per cycle at maximum fill for each wash/cycle temperature combination setting, as provided in section 3.4.1.

TUF_i =applicable temperature use factor in section 5 or 6.

n =number of wash/rinse temperature combination settings available to the user for the clothes washer under test.

and

$$Eh_{\min} = \sum_{j=1}^n [Eh_j \times TUF_j]$$

where:

Eh_j =reported electrical energy consumption in kilowatt-hours per cycle at minimum fill for each wash/rinse temperature combination setting, as provided in section 3.4.1.

TUF_j =applicable temperature use factor in section 5 or 6.

n =as defined above in this section.

4.1.5.2.2 *Weighted per-cycle machine electrical energy consumption.* Calculate the weighted per cycle machine energy consumption, M_E , expressed in kilowatt-hours per cycle and defined as:

$$M_E = [Eh_{\max} \times F_{\max}] + [Eh_{\min} \times F_{\min}]$$

where:

F_{\max} =as defined in section 4.1.3.

F_{\min} =as defined in section 4.1.3.

Eh_{\max} =as defined in section 4.1.5.2.1.

Eh_{\min} =as defined in section 4.1.5.2.1

4.1.6 *Total per-cycle energy consumption when electrically heated water is used.* Calculate for the normal cycle the total per-cycle energy consumption, E_{TE} , using electrically heated water, expressed in kilowatt-hours per cycle and defined as:

$$Q_{\max} = X_1 \sum_{i=1}^n [(Vh_i + Vc_i) \times TUF_i] + X_2 [TUF_w \times (Sh_H + Sc_H)]$$

where:

Vh_i =hot water consumption in gallons per-cycle at maximum fill for each wash/rinse temperature combination setting, as provided in section 3.4.2.

Vc_i =total cold water consumption in gallons per-cycle at maximum fill for each wash/rinse temperature combination setting, cold wash/cold rinse cycle, as provided in section 3.4.2.

TUF_i =applicable temperature use factor in section 5 or 6.

n =number of wash/rinse temperature combination settings available to the user for the clothes washer under test.

TUF_w =temperature use factor for warm wash setting.

$$E_{TE} = E_T + M_E$$

where:

E_T =as defined in section 4.1.3.

M_E =as defined in section 4.1.5.1 or 4.1.5.2.2.

4.2 *Per-cycle energy consumption for removal of RMC.* Calculate the amount of energy per cycle required to remove RMC. Such amount is D_E , expressed in kilowatt-hours per cycle and defined as:

$$D_E = (LAF) \times (\text{test load weight}) \times (RMC - 4\%) \times (DEF) \times (DUF)$$

where:

LAF =load adjustment factor=0.52.

Test load weight=as shown in test load table in 3.3.2 expressed in lbs/cycle.

RMC =as defined in 3.3.3.5, 3.3.4.3, or 3.3.5.

DEF =nominal energy required for a clothes dryer to remove moisture from clothes=0.5 kWh/lb (1.1 kWh/kg).

DUF =dryer usage factor, percentage of washer loads dried in a clothes dryer=0.84.

4.3 *Water consumption.*

4.3.1 *Per-cycle temperature-weighted water consumption for maximum and minimum water fill levels.* To determine these amounts, calculate for the cycle under test the per-cycle temperature-weighted total water consumption for the maximum water fill level, Q_{\max} , and for the minimum water fill level, Q_{\min} , expressed in gallons per cycle (or liters per cycle) and defined as:

For clothes washers equipped with suds-saver feature:

X_1 =frequency of use without suds-saver feature=0.86

X_2 =frequency of use with suds-saver feature=0.14

Sh_H =fresh hot water make-up measured during suds-return cycle at maximum water fill level.

Sc_H =fresh cold water make-up measured during suds-return cycle at maximum water fill level.

For clothes washers not equipped with suds-saver feature:

X_1 =1.0

X_2 =0.0

and

$$Q_{\min} = X_1 \sum_{j=1}^n \left[(Vh_j + Vc_j) \times TUF_j \right] + X_2 \left[TUF_w \times (Sh_L + Sc_L) \right]$$

where:

Vh_j=hot water consumption in gallons per cycle (or liters per cycle) at minimum fill for each wash/rinse temperature combination setting, as provided in section 3.4.3.

Vc_j=cold water consumption in gallons per cycle (or liters per cycle) at minimum fill for each wash/rinse temperature combination setting, cold wash/cold rinse cycle, as provided in section 3.4.3.

TUF_j=applicable temperature use factor in section 5 or 6.

Sh_L=fresh hot make-up water measured during suds-return cycle at minimum water fill level.

Sc_L=fresh cold make-up water measured during suds-return cycle at minimum water fill level.

n=as defined above in this section.

TUF_w=as defined above in this section.

X₁=as defined above in this section.

X₂=as defined above in this section.

4.3.2 Total weighted per-cycle water consumption. To determine this amount, calculate the total weighted per cycle water consumption, Q_T, expressed in gallons per cycle (or liters per cycle) and defined as:

$$Q_T = [Q_{\max} \times F_{\max}] + [Q_{\min} \times F_{\min}]$$

where:

F_{max}=as defined in section 4.1.3.

F_{min}=as defined in section 4.1.3.

Q_{max}=as defined in section 4.3.1.

Q_{min}=as defined in section 4.3.1.

4.3.3 Water consumption factor. The following calculates the water consumption factor, WCF, expressed in gallon per cycle per cubic foot (or liter per cycle per liter):

$$WCF = Q_T / C$$

where:

C=as defined in section 3.1.5.

Q_T=as defined in section 4.3.2.

4.4 Modified energy factor. The following calculates the modified energy factor, MEF, expressed in cubic feet per kilowatt-hours per cycle (or liters per kilowatt-hours per cycle):

$$MEF = \frac{C}{(M_E + E_T + D_E)}$$

where:

C=as defined in section 3.1.5.

M_E=as defined in section 4.1.5.1 or 4.1.5.2.2.

E_T=as defined in section 4.1.3.

D_E=as defined in section 4.2.

4.5 Energy factor. Calculate the energy factor, EF, expressed in cubic feet per kilowatt-hours per cycle (or liters per kilowatt-hours per cycle), as:

$$EF = \frac{C}{(M_E + E_T)}$$

where:

C=as defined in section 3.1.5.

M_E=as defined in section 4.1.5.1 or 4.1.5.2.2.

E_T=as defined in section 4.1.3.

5. Applicable Temperature Use Factors for Determining Hot Water Usage for Various Wash/Rinse Temperature Selections for All Automatic Clothes Washers

5.1 Clothes washers with discrete temperature selections.

5.1.1 Five-temperature selection (n=5).

Wash/rinse temperature setting	Temperature Use Factor (TUF)
Hot/Warm	0.18
Hot/Cold .....	.12
Warm/Warm .....	.30
Warm/Cold .....	.25
Cold/Cold .....	.15

5.1.2 Four-temperature selection (n=4).

Wash/rinse temperature setting	Temperature Use Factor (TUF)
Alternate I:	
Hot/Warm	0.18
Hot/Cold .....	.12
Warm/Cold .....	.55
Cold/Cold .....	.15
Alternate II:	
Hot/Warm	0.18
Hot/Cold .....	.12
Warm/Warm .....	.30
Warm/Cold .....	.40
Alternate III:	
Hot/Cold	0.12
Warm/Warm .....	.18
Warm/Cold .....	.55
Cold/Cold .....	.15

5.1.3 Three-temperature selection (n=3).

Wash/rinse temperature setting	Temperature Use Factor (TUF)
Alternate I:	
Hot/Warm	0.30
Warm/Cold .....	.55
Cold/Cold .....	.15
Alternate II:	
Hot/Cold	0.30

Wash/rinse temperature setting	Temperature Use Factor (TUF)
Warm/Cold .....	.55
Cold/Cold .....	.15
Alternate III:	
Hot/Cold	0.30
Warm/Warm .....	.55
Cold/Cold .....	.15

5.1.4 Two-temperature selection (n=2).

Wash/rinse temperature setting	Temperature Use Factor (TUF)
Any heated water/Cold	0.85
Cold/Cold .....	.15

5.1.5 One-temperature selection (n=1).

Wash/rinse temperature setting	Temperature Use Factor (TUF)
Any	1.00

5.2 Clothes washers with infinite temperature selections.

Wash/rinse temperature setting	Temperature Use Factor (TUF)	
	≤ 140 °F (60 °C) (n=3)	> 140 °F (60 °C) (n=4)
Extra-hot	0.05	
Hot	0.30	0.25
Warm	0.55	0.55
Cold	0.15	0.15

6. Applicable Temperature Use Factors for Determining Hot Water Usage for Various Wash/Rinse Temperature Settings for All Semi-Automatic, Non-Water-Heating, Clothes Washers

6.1 Six-temperature settings (n=6).

Wash/rinse temperature setting	Temperature Use Factor (TUF)
Hot/Hot	0.15
Hot/Warm .....	.09
Hot/Cold .....	.06
Warm/Warm .....	.42
Warm/Cold .....	.13
Cold/Cold .....	.15

7. Waivers and Field Testing

7.1 *Waivers and Field Testing for Non-conventional Clothes Washers.* Manufacturers of non-conventional clothes washers, such as clothes washers with adaptive control systems, must submit a petition for waiver pursuant to 10 CFR 430.27 to establish an acceptable test procedure for that clothes washer. For these and other clothes washers that have controls or systems such that the DOE test procedures yield results that are so unrepresentative of the clothes washer's true

energy consumption characteristics as to provide materially inaccurate comparative data, field testing may be appropriate for establishing an acceptable test procedure. The following are guidelines for field testing which may be used by manufacturers in support of petitions for waiver. These guidelines are not mandatory and the Department may determine that they do not apply to a particular model. Depending upon a manufacturer's approach for conducting field testing, additional data may be required. Manufacturers are encouraged to communicate with the Department prior to the commencement of field tests which may be used to support a petition for waiver. Section 7.3 provides an example of field testing for a clothes washer with an adaptive water fill control system. Other features, such as the use of various spin speed selections, could be the subject of field tests.

7.2 *Non-conventional Wash System Energy Consumption Test.* The field test may consist of a minimum of 10 of the nonconventional clothes washers ("test clothes washers") and 10 clothes washers already being distributed in commerce ("base clothes washers"). The tests should include a minimum of 50 normal test cycles per clothes washer. The test clothes washers and base clothes washers should be identical in construction except for the controls or systems being tested. Equal numbers of both the test clothes washer and the base clothes washer should be tested simultaneously in comparable settings to minimize seasonal and/or consumer laundering conditions and/or variations. The clothes washers should be monitored in such a way as to accurately record the total energy consumption per cycle. At a minimum, the following should be measured and recorded throughout the test period for each clothes washer: Hot water usage in gallons (or liters), electrical energy usage in kilowatt-hours, and the cycles of usage. The field test results would be used to determine the best method to correlate the rating of the test clothes washer to the rating of the base clothes washer. If the base clothes washer is rated at A kWh per year, but field tests at B kWh per year, and the test clothes washer field tests at D kWh per year, the test unit would be rated as follows:

$$A \times (D/B) = G \text{ kWh per year}$$

7.3 *Adaptive water fill control system field test.* Section 3.2.2.1 defines the test method for measuring energy consumption for clothes washers which incorporate control systems having both adaptive and alternate manual selections. Energy consumption calculated by the method defined in section 3.2.2.1 assumes the adaptive cycle will be used 50 percent of the time. This section can be used to develop field test data in support of a petition for waiver when it is believed that the adaptive cycle will be used more

Department of Energy

Pt. 430, Subpt. B, App. J1

than 50 percent of the time. The field test sample size should be a minimum of 10 test clothes washers. The test clothes washers should be totally representative of the design, construction, and control system that will be placed in commerce. The duration of field testing in the user's house should be a minimum of 50 normal test cycles, for each unit. No special instructions as to cycle selection or product usage should be given to the field test participants, other than inclusion of the product literature pack which should be shipped with all units, and instructions regarding filling out data collection forms, use of data collection equipment, or basic procedural methods. Prior to the test clothes washers being installed in the field test locations, baseline data should be developed for all field test units by conducting laboratory tests as defined by section 1 through section 6 of these test procedures to determine the energy consumption values. The following data should be measured and recorded for each wash load during the test period: wash cycle selected, the mode of the clothes washer (adaptive or manual), clothes load dry weight (measured after the clothes washer and clothes dryer cycles are completed) in pounds, and type of articles in the clothes load (i.e., cottons, linens, permanent press, etc.). The wash loads used in calculating the in-home percentage split between adaptive and manual cycle usage should be only those wash loads which conform to the definition of the normal test cycle.

Calculate:

T = The total number of normal test cycles run during the field test

T_a = The total number of adaptive control normal test cycles

T_m = The total number of manual control normal test cycles

The percentage weighting factors:

$P_a = (T_a/T) \times 100$ (the percentage weighting for adaptive control selection)

$P_m = (T_m/T) \times 100$ (the percentage weighting for manual control selection)

Energy consumption values, E_T , M_E , and D_E (if desired) calculated in section 4 for the manual and adaptive modes, should be combined using P_a and P_m as the weighting factors.

8. Sunset

The provisions of this appendix J expire on December 31, 2003.

[62 FR 45501, Aug. 27, 1997, as amended at 66 FR 3330, Jan. 12, 2001; 66 FR 8745, Feb. 2, 2001]

APPENDIX J1 TO SUBPART B OF PART 430—UNIFORM TEST METHOD FOR MEASURING THE ENERGY CONSUMPTION OF AUTOMATIC AND SEMI-AUTOMATIC CLOTHES WASHERS

The provisions of this appendix J1 shall apply to products manufactured beginning January 1, 2004.

1. Definitions and Symbols

1.1 *Adaptive control system* means a clothes washer control system, other than an adaptive water fill control system, which is capable of automatically adjusting washer operation or washing conditions based on characteristics of the clothes load placed in the clothes container, without allowing or requiring consumer intervention or actions. The automatic adjustments may, for example, include automatic selection, modification, or control of any of the following: wash water temperature, agitation or tumble cycle time, number of rinse cycles, and spin speed. The characteristics of the clothes load, which could trigger such adjustments, could, for example, consist of or be indicated by the presence of either soil, soap, suds, or any other additive laundering substitute or complementary product.

NOTE: Appendix J1 does not provide a means for determining the energy consumption of a clothes washer with an adaptive control system. Therefore, pursuant to 10 CFR 430.27, a waiver must be obtained to establish an acceptable test procedure for each such clothes washer.

1.2 *Adaptive water fill control system* means a clothes washer water fill control system which is capable of automatically adjusting the water fill level based on the size or weight of the clothes load placed in the clothes container, without allowing or requiring consumer intervention or actions.

1.3 *Bone-dry* means a condition of a load of test cloth which has been dried in a dryer at maximum temperature for a minimum of 10 minutes, removed and weighed before cool down, and then dried again for 10 minute periods until the final weight change of the load is 1 percent or less.

1.4 *Clothes container* means the compartment within the clothes washer that holds the clothes during the operation of the machine.

1.5 *Compact* means a clothes washer which has a clothes container capacity of less than 1.6 ft³ (45 L).

1.6 *Deep rinse cycle* means a rinse cycle in which the clothes container is filled with water to a selected level and the clothes load is rinsed by agitating it or tumbling it through the water.

1.7 *Energy test cycle* for a basic model means (A) the cycle recommended by the manufacturer for washing cotton or linen